Gasket Performance Standards and Application Toward Fugitive Emissions Reductions

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FLUID SEALING ® ASSOCIATION FSA

Agenda

- Review of basic gasket data used in equipment design
- Enhanced manufacturer data for application specific performance evaluation
- Gasket performance standards under development
- How valve OEM’s and end-users can achieve emerging emissions reduction requirements

Basic Gasket Data

- Most engineers, technical personnel, and installation professionals involved with valve design and installation will inevitably need to consider a stationary seal at some point
  - Bonnet gaskets
  - Multi-piece body seal gaskets
  - Flange connection gaskets

Basic Gasket Data

- How is the gasket requirement typically evaluated?
  - Identify pressure limits of the valve/system design
  - Identify temperature limits of the valve/system design
  - Identify typical media applications where the valve will be used most often
  - And sometimes… Identify the level of tightness that the overall valve/system is being designed to meet

Basic Gasket Data

- But <u>when</u> are gaskets considered in the design process?
  - Gasket manufacturer's data would indicate that gaskets are considered far too late in the valve/system design process
- This can sometimes limit the available material choices AND the level of tightness that can be achieved
  - Sealability, chemical compatibility, and blowout resistance can all be compromised

Basic Gasket Data

- What gasket data are we talking about so far…
  - Gasket Factors: m & Y
  - Maximum Pressure (Blowout)
  - Maximum/Minimum Temperature
  - Chemical Resistance Data
  - Creep Resistance
- Commonly found on gasket manufacturer's websites

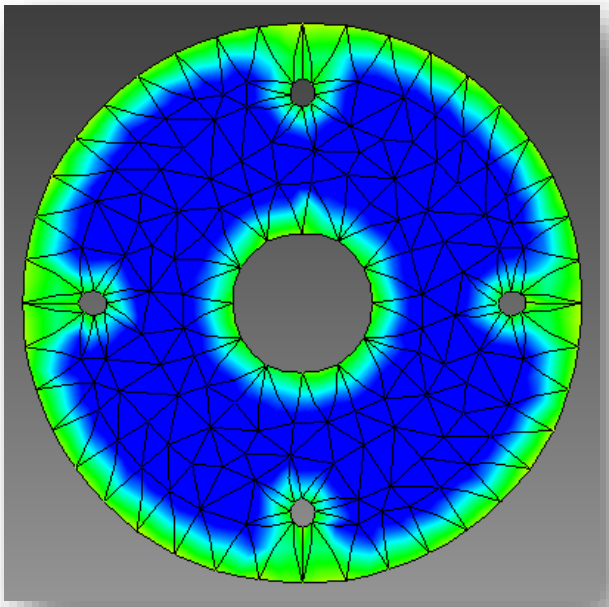
Enhanced Gasket Manufacturer Data

- Typical published data is meant for standard, non-critical, or non-enhanced applications
  - It can get you close but we're not talking close here

- Gasket manufacturers analyze their products several degrees beyond what is published
  - Why?
  - Why not share this information openly?

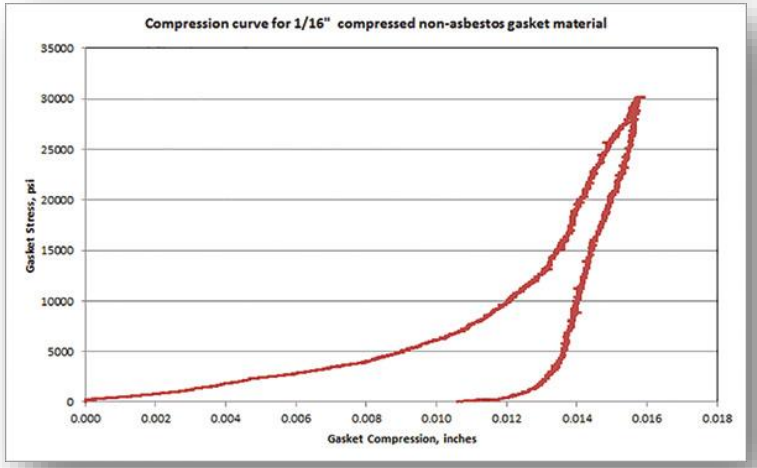
Enhanced Gasket Manufacturer Data

- Manufacturers want to help – they want a stake in the game and a seat at the table
- Internal data analytics can provide valve OEM's with significantly enhanced seal performance of their products thus allowing them to achieve tighter closures to meet evolving emissions regulations



Enhanced Gasket Manufacturer Data

- Enhanced gasket factors (mechanical and leakage criteria) vs conventional M&Y (mechanical criteria only) data
  - PVRC ROTT (G_b, s, G_s)
  - EN 13555 / EN 1591 ($Q_{min(L)}$, $Q_{Smin(L)}$, Q_{smax})
  - DIN E 2505 / DIN E 28090 ($\sigma_{VU/L}$, $\sigma_{BU/L}$, $m_{/L}$)
- Load-unload curves
- Hot creep relaxation
- Finite Element Analysis (FEM)
- Installation
- Other/similar applications
- Gasket familiarity and selection



Enhanced Gasket Manufacturer Data

- Working with the gasket manufacturer can provide:
  - Faster solutions
  - Reduced analytical costs
  - Better solutions
  - Better valve/system leakage performance

Get to know your gasket manufacturer.

Gasket Performance Standards

- Currently there aren't many performance based standards for gasket materials
  - Testing standards are primarily for quality control purposes and physical property analysis/comparison
- ASTM F2716: Standard Practice for Comparison of Nonmetallic Flat Gaskets in High Pressure Saturated Steam (FSA-NMG-204-02)
  - Very good for evaluating various nonmetallic gaskets for long-term use (test 2,000 – 8,000+ hours)

Gasket Performance Standards

- Several new and hybrid styles of gaskets have emerged into the market in the last 10 years
  - Existing test standards do not evaluate these products well
  - OEM's and end-users are not able to easily determine suitability and often will not be the guinea pig
  - New technologies are very good and ready to meet "ultra low emissions" requirements

Gasket Performance Standards

- Fluid Sealing Association (FSA) Gasket Division Technical Subcommittee
  - Currently developing a performance standard for semi-metallic gaskets (spiral wound, kammprofile, corrugated metal insert) commonly used in the valve OEM industry
    - Leakage qualification standards on this product group is lacking
    - Standard is being developed to eventually use methane gas at high temperatures
    - FSA is looking for additional gasket manufacturers and affiliates (OEM's, engineers, etc.) to become involved in this development in order to capture all facets of ultra-low emissions requirements

Achieving Emerging Emissions Regulation Requirements

- Fully analyze the application and the emissions requirements
- Fully analyze the existing sealing materials being used and understand what is not working
- Apply enhanced gasket data and analyze various scenarios
- Apply gasket manufacturer recommended installation procedures
- Test and validate

Achieving Emerging Emissions Regulation Requirements

- Proposed and emerging legislation is not daunting and from a fluid sealing (gaskets) existence, is completely achievable and surpassable
  - Members of the FSA have the existing technology to assist OEM's and end-users
- New technology costs are not prohibitive (gaskets are one of the lowest cost components in any system)
- Gasket manufacturers are ready to work with any group looking for improvements in leakage containment

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Thank You

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